The CRUSHED STONE JOURNAL

In This Issue

Program for Sixteenth Annual Convention Nears Completion

Tentative Program Detroit Convention

Freezing and Thawing Tests of Concrete Made With Stone-Sand Fine Aggregate

November-December • 1932

Official Publication
NATIONAL CRUSHED STONE ASSOCIATION

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NIAGARA TESTING UNIT—A combination vibrating and rotating unit for laboratory and general test purposes. Can be operated with stationary, intermittent or full rotating motion. Adjustable degree of slope.

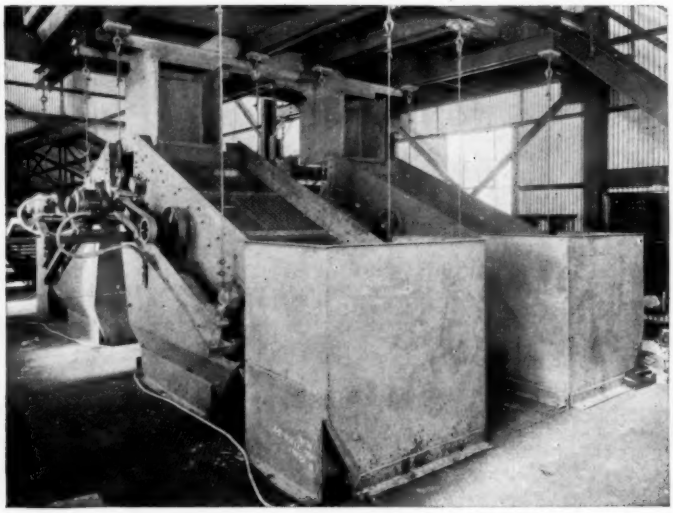

Photo shows four of the 16 Niagara Vibrating Screens in service at new plant of Hudson River Stone Corporation.

ALL of the 16 vibrating screens in the gigantic new crushing and sizing plant of the HUDSON RIVER STONE CORPORATION at Cold Spring, New York, are Niagaras; with a total capacity of 7500 cubic yards per day. The experienced engineers who selected equipment for this important plant knew that Niagaras have demonstrated their superiority in every field where screens are used, by increasing capacity, and improving the quality of the finished product. Niagara Superiority is the logical result of correct design.

NIAGARA INDUSTRIAL UNIT—A compact, self-contained screening unit, for moderate operations. Capacity dependent upon size of wire mesh. The ideal equipment for small industrial work up to 325 mesh sizing. Adjustable angle of discharge.

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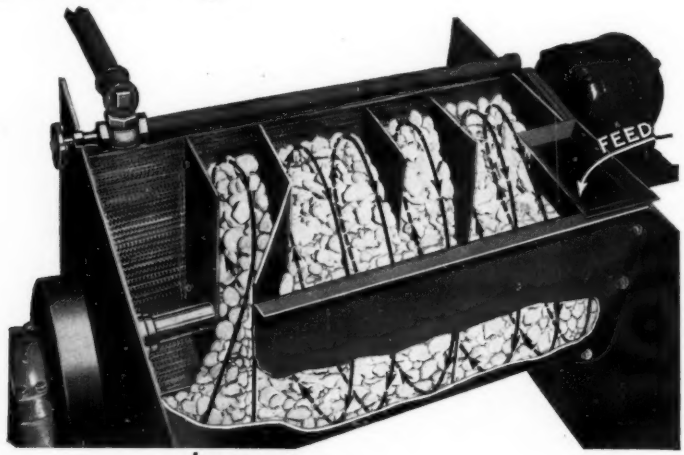

NIAGARA GYRATING TUBE SCRUBBER—An entirely new principle in scrubbing, enormous capacity with very low power consumption—grading and separating may be accomplished while scrubbing. Foreign matter and dirty water are eliminated while scrubbing.

See our Exhibit at the Joint Exposition
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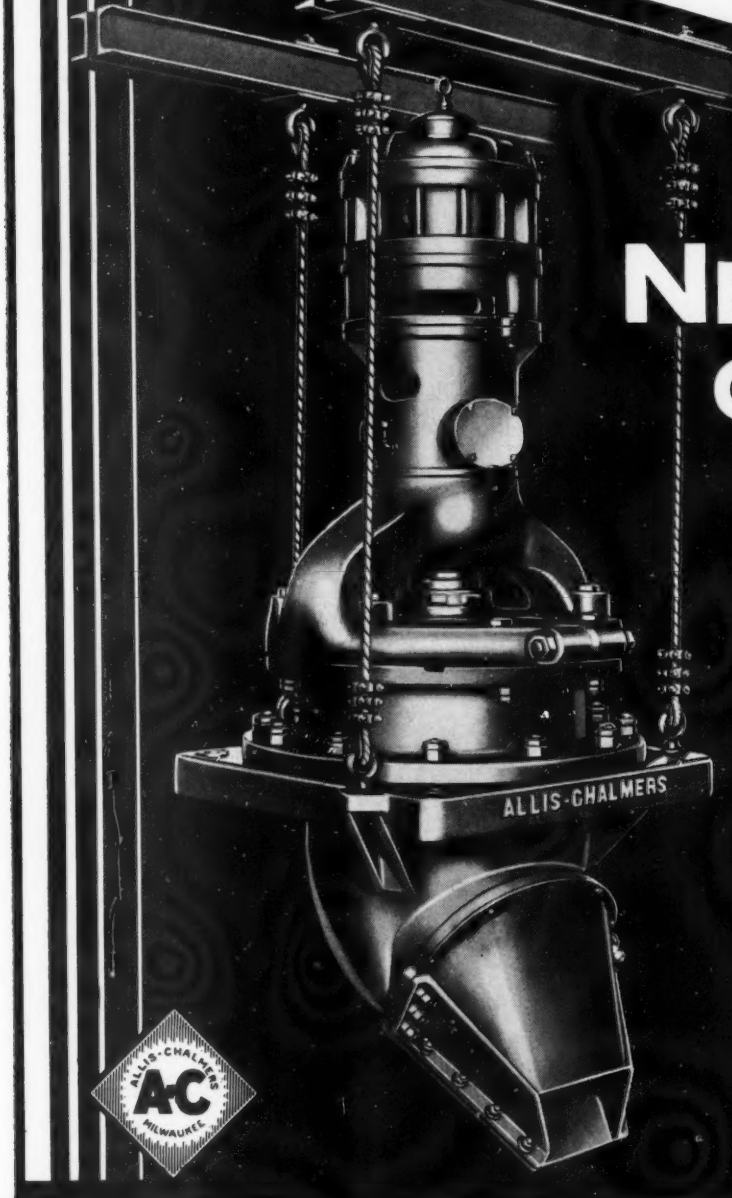

YOU will like the short, rapid crushing action of this crusher and the grading of the product. The method of suspending the crusher from the framework of the building eliminates expensive foundations and permits installing the crusher in the most advantageous locations. It is a simple crusher with a direct connected motor. There are no gears, pinions, pulleys, or belts. The few working parts are lubricated through a positive oiling system that includes a filtering and cooling unit.

Bulletin 1469-B tells more about the Newhouse Crusher. Just write for it.

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DIPPERS OF QUALITY

Manganese Steel

SATISFIED CUSTOMERS ARE GREAT ASSETS

This 2½ Cu. Yd. Dipper is made entirely of Indian Brand Manganese Steel and fitted with "Carlisle" Reversible Dipper Teeth. It has dug 908,707 tons of rock and still good for many years of service.

JOHN S. LANE & SON, INCORPORATED.

DEALERS IN TRAP ROCK.

MERIDEN, CONN.

Oct. 8, 1931

E. L. Pemberton & Co.,
60 East 42nd St.,
New York, N. Y.

Gentlemen:

Answering your letter of the 5th inst., requesting information as to our experience with the 2 1/2 cu. yd. Dipper you furnished for our Marion Model 70 Shovel in 1927.

Our experience has been most satisfactory, and this particular Dipper has loaded 908,707 tons of Stone in addition to a good deal of stripping - the exact quantity of which I cannot give you. The Shovel happens to be located in one of our quarries which has not run now for more than a year, but it is by no means worn out yet, and in fact we count on several years use of it still.

Very truly yours,

John S. Lane & Son, Incorporated,

A S Lane
Treasurer.

(Photo of Dipper after 4 years' service)

WHY NOT USE THE BEST—IT COSTS NO MORE

"Carlisle" Reversible Teeth

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H. A. Johann, 508 Rialto Bldg., St. Louis, Mo.
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SALES AGENTS

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The Frog, Switch & Manuf'g. Co.
CARLISLE, PA.
Established in 1881

The Crushed Stone Journal

Official Publication of the NATIONAL CRUSHED STONE ASSOCIATION

J. R. BOYD, Editor

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A. T. Goldbeck

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A Congress of Opportunity*

TOO FEW of our people understand the profound influence of our construction activities upon the economic health and prosperity of the nation. Almost everyone sees only their immediate aspects—they create taxes, cause temporary inconvenience or, at best, they provide new or improved facilities for doing something or going somewhere.

But the average business man does not see them as employing millions of men and women, using the products of innumerable mines, mills and factories, delivering thousands of carloadings to the railroads, absorbing millions of horsepower generated by the utilities.

He does not see their economic significance—that they convert our surplus earnings into billions of dollars of new consuming and buying power, so vitally necessary to the trade of Main Street. Only when construction work is curtailed, as now, is he aware of his devastating loss and conscious of its tremendous importance to him.

Thus the operations of the construction industry are of major concern to American business, probably second in importance only to agriculture. When construction prospers, there is prosperity for all; when it languishes the life-blood ebbs from the arteries of trade. It is impossible to imagine a prosperous America, under our present economic system, without a substantial and consistent construction program.

So the health of the construction industry is a matter of intimate concern to every American citizen; its problems are his problems, its strength is his prosperity.

Because of all this, unusual importance attaches to the forthcoming Highway and Building Congress, to be held in Detroit during the week of January sixteenth. For the first time in its history, all the elements of the construction industry will assemble to deal with its problems and to interpret its significance to the rest of the community.

More than twenty associations and groups of national scope and influence in the highway and building fields will hold their annual conventions in Detroit that week and will then unite in a two-day joint Congress. Thousands of public officials, engineers, architects, builders, contractors, equipment manufacturers and distributors, material producers and dealers will attend. Hundreds of manufacturers will exhibit during the week the materials, machinery and equipment they provide to help the architect, engineer and constructor meet the need of the times for more substantial structures and lower costs.

Here will be an unprecedented attack upon an unprecedented problem. It deserves the interest and support of all. Every one engaged in any department of construction will find at the Congress some measure of help and inspiration; every manufacturer whose products find a use in construction or highway maintenance will meet a huge and interested audience, probably the greatest ever assembled in one place by this far-flung industry.

And most important of all will be the opportunity offered by the Congress to interpret to the business man, the legislator and the general public the economic importance of the national highway program and of the building industry. For the first time the several elements of the construction industry will be assembled into a united group; for the first time they will speak through a common voice. Let us do our best to seize this opportunity for a united effort to conserve the welfare and foster the progress of the industry, both of so vital a concern to all of the people.

WILLARD CHEVALIER,
Publishing Director

* *Reprinted from* CONSTRUCTION METHODS *December, 1932*

THE CRUSHED STONE JOURNAL

WASHINGTON, D. C.

Vol. VIII No. 7 NOVEMBER-DECEMBER, 1932

Program for Sixteenth Annual Convention Nears Completion

"HAPPY NEW YEAR" may seem an empty phrase to many who read these lines. Doubtless but few of us can remember passing through a year fraught with the difficulties and perplexities of the one just concluded, and the outlook for 1933 is none too encouraging. Yet, as we leave the holiday season behind, and turn our thoughts to what lies ahead, it seems entirely fitting that we use this age old expression not so much for its literal meaning, but for that which it connotes—a deep-rooted belief which lies within us all that, with courage to face the future and with an unswerving loyalty to our ideals and objectives, we can confront the new year with renewed enthusiasm and truly make it a happy and prosperous one. This is no time to bemoan the disappointments of the past. None of us can escape the vicissitudes of life but, by the same token, to accept them with an oriental fatalism is contrary to the very essence of our industrial success. It is high time to raise our sights to new horizons and studiously and energetically plan for the months ahead, forgetting the trying experiences of the year just passed, except as they may serve to better chart our future course.

The annual convention gives us the only opportunity throughout the year when we can meet together, readjust our sights and obtain new perspectives which are so essential to orderly progress. For fifteen years crushed stone producers have been gathering together during the month of January with results which are known to all. Our Sixteenth Annual Meeting will be held on January 16, 17 and 18, 1933, at the Book-Cadillac Hotel, Detroit, Michigan. Never, during the fifteen years of our existence, has there been a greater need for this "meeting of minds" of our industry.

The program for our forthcoming meeting is rapidly being completed and we believe offers so much of value to crushed stone producers that attendance "en masse" seems assured. The program in detail is given elsewhere in this issue, but we feel the following brief review will convince you that it is more than worth your while to be with us at Detroit.

◆ Over thirty organizations will participate in Highway and Building Congress in Detroit during week of January 16, 1933. Space already subscribed for Joint Exposition insures its success.

The convention will open at 10:00 o'clock on Monday morning, January 16, with the Presidential Address of A. L. Worthen. He will be followed by the reports of directors on business conditions in 1932 and the outlook for 1933. These reports should be more significant than ever before and a special effort will be made to have them as comprehensive as possible. Following the reports of the directors, George E. MacIlwain, Business Economist, Lecturer and Analyst, will talk to us. Mr. MacIlwain needs no introduction to crushed stone producers, for on a number of occasions in the past we have enjoyed the distinct privilege of hearing his inspiring messages. Mr. MacIlwain is a close student of economic conditions and his thoughts should be extremely helpful to us in the conduct of our affairs during 1933.

The "Greeting Luncheon" will be held at 1:00 o'clock on Monday and promises to be one of the most inspiring and enjoyable occasions of this nature which we have had since this custom was inaugurated. We consider ourselves exceptionally fortunate in having obtained to address the luncheon, Billy B. Van of Newport, New Hampshire, who has had a most colorful life and risen to heights of fame under the most adverse circumstances. His talk to us on "Sunshine in Business" will inspire us all to put forth renewed effort during the coming year.

The Monday afternoon session will open at 2:30 P. M. with a paper entitled, "Research—Industrial Insurance," presented by Maurice Holland, Director, Division of Engineering and Industrial Research, National Research Council, New York City. During the last year, an exhaustive study has been made of the benefits of industrial research and Mr. Holland will convincingly show us how necessary it is to continue research activities, if we are to keep our heads above water.

Every industry must always be alert for new developments and it is the proper function of the annual convention to place before us such developments for critical and intelligent analysis. The highway engineering field has recently had its attention directed to a new type of road in which crushed stone producers should be particularly interested. Mr. E. M. Fleming, Manager, Highways and Municipal Bureau, Portland Cement Association, Chicago, Illinois, has consented to place this matter before us under the title, "The Cement-Bound Macadam Road." Arrangements have been nearly completed for having an outstanding engineer lead the discussion of Mr. Fleming's paper, following which the floor will be open for general discussion.

With the increase in density of traffic which is taking place so rapidly, the widening of highways has become a most serious problem. This field offers an excellent outlet for crushed stone and Fred Swineford, Chief Engineer, Ohio Crushed Stone Association, Columbus, Ohio, will talk to us on the subject, "The Use of Crushed Stone for Widening Highways." George Martin, Consulting Engineer, The Barrett Co., New York City, and possibly Bernard Gray, Highway Engineer, The Asphalt Institute, New York City, will discuss this subject from their respective points of view.

It is gratifying to note the increasing popularity of the use of stone sand and everything which can be done to remove some of the prejudices which have existed concerning its use constitutes a decided step forward. C. B. Porter, Resident Engineer, Chesapeake and Ohio Railroad Co., Talcott, W. Va., will describe for us, "The Use of Stone Sand in the Big Bend Tunnel on the Chesapeake and Ohio Railroad" and his paper will certainly be a significant contribution to the literature on this subject. This paper and the general discussion which follows should do much to extend the use of this valuable by-product of the crushed stone industry.

On Monday evening at 7:30 the formal opening of the Joint Exposition of the Manufacturers' Divisions of the National Crushed Stone Association, the National Ready Mixed Concrete Association and the National Sand and Gravel Association will take place. This feature of the annual convention will be held in the attractive Italian Garden and Crystal Ballroom of the Book-Cadillac Hotel, adjoining rooms located on the main convention floor, thus insuring easy accessibility to those in attendance at the meeting. In view of present prevailing conditions it is highly gratifying to be able to report at this writing that approximately eighty per cent of the available booth space has already been subscribed and there seems reasonable assurance that the remaining space will be taken before the opening of the exposition on Monday evening. A limited amount of desirable space is still available and to those who expect to exhibit but have not yet made application for space, we urge that immediate action be taken in order to avoid possible disappointment.

We have cause to believe that the topic, "The Readjustment Era—Its Relation to Plant Values" is a most timely one. George D. Bailey, Detroit Partner, Ernst and Ernst, has consented to address us on this subject. The discussion will be led by Wm. E. Hilliard, Gen. Mgr., New Haven Trap Rock Co., New Haven, Conn., who will direct our attention to some of the important considerations of this subject from the plant executive's point of view.

Within our industry the question of "Standardization of Sizes" refuses to be ignored and in fact, under the stimulus of renewed effort to take advantage of every possible economy in the production of crushed stone, has again forged to the front. No one in this country is better qualified to discuss this subject than F. H. Jackson, Senior Testing Engineer, U. S. Bureau of Public Roads, and we shall all listen to Mr. Jackson with interest to learn what progress has been made in this direction.

Relatively few of our members fully appreciate the wide scope of activities of our Bureau of Engineering and the innumerable ways in which it can be of assistance to crushed stone producers. A. T. Goldbeck, Director of this Bureau, will address the convention on the subject, "How the Bureau of Engineering Helps the Crushed Stone Industry," and we feel certain that Mr. Goldbeck's talk will point the way for many of our members to a greater and more effective use of this important Association activity.

No alert, wide-awake producer can afford to miss the Tuesday afternoon program, for here we are getting down to bedrock for an intimate discussion of the more serious developments of the past year. We have always had with us to more or less degree the problem of meeting competition from wayside plants, but it is during the last few months that this danger has increased to alarming proportions. In view of this acute situation, it has been deemed highly necessary to have a symposium on "Competition of Wayside Plants," not with the thought in mind that we shall develop a cure-all for this form of competition, but because of the belief that effective remedial measures have been devised and that a general discussion of the situation will be mutually beneficial. The symposium will be opened by a talk from Mr. Goldbeck, Director of our Bureau of Engineering, entitled, "Significance of the Development of Wayside Plants" in which the problem will be

reviewed as definitely as possible, supplemented by information recently developed from a questionnaire which has been answered by a number of state highway departments. This introduction of the subject will be followed by a talk entitled, "How Can the Large Commercial Plant Meet Wayside Competition?" which in turn will be followed by a paper on "The Wayside Plant as Viewed by the Contractor." In the general discussion which follows, an opportunity will be given for a free exchange of ideas. It would seem safe to say that this symposium will be one of the high spots on the Detroit program.

Because of the large proportion of delivered cost of aggregates which goes for transportation, this subject has always been of keen interest to producers. A factor which has increased the difficulties of an already complex situation is the advent of the motor truck as a means of transporting aggregate. This situation at present is highly chaotic to say the least and because of its unsuccessful solution to date has done much to demoralize prices. To bring us up to date in this matter, a paper will be delivered by a speaker yet to be determined, on the subject, "Transportation by Rail and by Truck."

The fight to obtain modification of the anti-trust laws has become intensified during the past year. There are some within our industry who think we should "let well-enough alone" and others who hold that one of the crying needs of the day is some effective means for price stabilization. A number of new developments in this field have taken place since last January and Mr. Gilbert Montague, who gave us such an able talk last year, will address us on the subject, "Stabilization and the Anti-Trust Laws." The discussion of his talk will be led by Harold Williams, member of the Boston Bar, a well-known and always welcome addition to our program.

During 1932 funds for highway construction have suffered a most severe set-back, very largely through diversion of gas tax money for purposes other than the building of roads. Various efforts have been made to check the wholesale diversion of gas tax funds and one of the most helpful discussions on the Detroit program should be that devoted to "Organizing to Combat Gas Tax Diversion." This subject will be presented from two points of view: First, where it was necessary to set up a new organization within the state, and second, where it was possible to take advantage of an already existing organization. The fight on gas tax diversion has really just begun and must be continued with increasing vigor during the coming year. How best to make our efforts effective will be one of the important considerations at Detroit.

It has been customary in past years at our annual convention to have a smoker and banquet, but with the decision to have a Highway and Building Congress, participated in by all of the leading organizations of the construction industry, it was deemed advisable, in order to avoid confusion and in the interests of economy, to hold such functions jointly, as events of the Congress. The first of these will be the Highway and Building Congress Smoker which will be held at 7:30 o'clock on Tuesday evening at the Municipal Airport, where the "Road Show" will be housed. There will be no charge for the Smoker, but admission cards must be procured from your Registration Desk at the Book-Cadillac.

The Highway and Building Congress Ball will be informal and at the Statler Hotel. The Banquet, likewise a Congress affair, will be at the Masonic Temple. Tickets for the Ball and seats for the Banquet are procurable at your registration desk at the Book-Cadillac. The Banquet, insofar as our knowledge goes, will bring together the largest assemblage of those interested in the construction industry and will be graced by speakers and entertainment appropriate to the occasion.

At the morning session on Wednesday, which will be the concluding day of our convention, we will be addressed by Dr. F. W. Lee, Supervising Engineer, Geophysical Section, U. S. Bureau of Mines, Washington, D. C. After the discussion following Dr. Lee's paper, the presentation of the award for the National Crushed Stone Association Safety Contest for 1931 will be made by Scott Turner, Director of the U. S. Bureau of Mines, and remarks of acceptance will be made by a representative of the winning company.

Beginning at 11:00 o'clock on Wednesday morning a business meeting of the National Crushed Stone Association will be held. In addition to the customary practice of hearing committee reports and the election of officers which is handled at this time, provision is being made for a definite discussion of Association policy and activity for the future. President Worthen will have a message for us which will be of the utmost interest and vital importance to every crushed stone producer.

Following the morning session, there will be held at 1:00 o'clock a "Joint Exposition Luncheon," sponsored by the Manufacturers' Divisions of the National Crushed Stone Association, the National Ready Mixed Concrete Association and the National Sand and Gravel Association.

At the conclusion of this luncheon, and in order that all present at Detroit may have ample opportunity for a studious and comprehensive inspection of the Joint Exposition, all of Wednesday afternoon has been set aside for this purpose. Forced to adopt every possible measure of economy, plant executives, superintendents and operating men will wish to take full advantage of this unparallelled opportunity to obtain first-hand information about the most recent improvements and developments in the machinery, equipment and supplies used in the production, distribution and consumption of crushed stone.

On Thursday and Friday, January 19 and 20, all or-

ganizations participating in the Congress are combining for a two-day program, Thursday being devoted to highway construction and Friday to building construction. The detailed program for highway day is given elsewhere in this issue, the building day program not yet being available for publication. This program, we believe, is an impressive illustration of the effort which is being put forth to stimulate an interest in continued highway construction. All crushed stone producers are not only cordially invited but earnestly requested to remain in Detroit for the two days of the Highway and Building Congress, including the Banquet on Thursday night. Col. Willard Chevalier, one of the foremost thinkers in the construction field today, has excellently set forth in a recent editorial reasons for participating in this Congress and we direct your attention to his remarks which appear on page 4.

And now in conclusion, just a few words regarding some important convention arrangements. In preparing this program, our underlying thought has been to make it timely, interesting, instructive and helpful and we believe this objective has been reached better than ever before. If the forthcoming convention is to be the success it should be, your presence is urgently needed in Detroit. Therefore—let nothing prevent your attendance and if you have not already done so, immediately write to Mr. J. Lee Barrett, Chairman, Hotel Committee, Detroit Convention and Tourist Bureau, 1805 Stroh Building, Detroit, Michigan, requesting reservations at the Book-Cadillac Hotel, our official headquarters. In writing to Mr. Barrett, be sure to indicate your connection with the crushed stone industry, as preferential treatment will be accorded those organizations having headquarters at the Book. Remember, also, that extraordinary reductions in railroad fare have been authorized, detailed information regarding which has been forwarded to you by letter.

We have done our level best to make this program attractive and the expenses of attending the convention a minimum. Do your part now by being with us in Detroit during the week of January 16!

Tentative Program—Detroit Convention

MONDAY, JANUARY 16

MORNING SESSION

A. L. Worthen, President, Presiding

10:00—Presidential Address—A. L. Worthen.
10:30—Reports of Directors on Business Conditions in 1932 and Outlook for 1933.
11:30—Address—George E. MacIlwain, Business Economist, Lecturer, Author and Analyst.
12:00—Appointment of Convention Committees.
Auditing
Nominating
Resolutions
12:10—Announcements.
12:15—Adjournment.

GREETING LUNCHEON

1:00—Everyone, including active and associate members, as well as guests, is cordially invited to attend.

"Sunshine in Business"—Billy B. Van, Newport, New Hampshire.

MONDAY, JANUARY 16

AFTERNOON SESSION

2:30—"Research — Industrial Insurance" — Maurice Holland, Director, Division of Engineering and Industrial Research, National Research Council, New York City.
2:50—"The Cement-Bound Macadam Road"—E. M. Fleming, Manager, Highways and Municipal Bureau, Portland Cement Association, Chicago, Ill.
3:10—Discussion.
3:30—"The Use of Crushed Stone for Widening Highways"—Fred Swineford, Chief Engineer, Ohio Crushed Stone Association, Columbus, Ohio.
3:50—Discussion.
4:10—"The Use of Stone Sand in the Big Bend Tunnel on the Chesapeake and Ohio Railroad"—C. B. Porter, Resident Engineer, Chesapeake and Ohio Railroad Co., Talcott, W. Va.
4:30—Discussion.
4:50—Announcements.
5:00—Adjournment.

MONDAY EVENING

7:30—Formal Opening of Joint Exposition of the Manufacturers' Divisions of the National Crushed Stone Association, National Ready Mixed Concrete Association and National Sand and Gravel Association.

TUESDAY, JANUARY 17

MORNING SESSION

10:00—"The Readjustment Era—Its Relation to Plant Value"—George D. Bailey, Detroit Partner, Ernst and Ernst, Detroit, Michigan.
10:20—Discussion—Led by Wm. E. Hilliard, General Manager, New Haven Trap Rock Co., New Haven, Conn.
10:40—"Standardization of Sizes"—F. H. Jackson, Senior Testing Engineer, U. S. Bureau of Public Roads, Washington, D. C.

11:00—Discussion.
11:20—"How the Bureau of Engineering Helps the Crushed Stone Industry"—A. T. Goldbeck, Director, Bureau of Engineering, National Crushed Stone Association.
11:40—Discussion.
12:10—Announcements.
12:15—Adjournment.

TUESDAY, JANUARY 17

Afternoon Session

2:00—Symposium — "Competition from Wayside Plants."
a. "Significance of the Development of Wayside Plants"—A. T. Goldbeck.
2:15 b. "How Can the Large Commercial Plant Meet Wayside Competition?" — Speaker to be determined.
2:30 c. "The Wayside Plant as Viewed by the Contractor"—Speaker to be determined.
2:45 d. General Discussion.
3:00—"Transportation by Rail and by Truck"—Speaker to be determined.
3:20—Discussion.
3:40—"Stabilization and the Anti-Trust Laws"—Gilbert H. Montague, Attorney-at-Law, New York City.
4:10—Discussion—Led by Harold Williams, Member of the Boston Bar, Boston, Mass.
4:30—"Organizing to Combat Gas Tax Diversion"—Speaker to be determined.
4:50—Discussion.
5:00—Adjournment.

TUESDAY EVENING

Highway and Building Congress Smoker—Municipal Airport, 7:30 o'clock—admission by card only, for which there is no charge.

WEDNESDAY, JANUARY 18

Morning Session

A. L. Worthen, President, Presiding

10:00—Address—Dr. F. W. Lee, Supervising Engineer, Geophysical Section, U. S. Bureau of Mines, Washington, D. C.
10:20—Discussion.
10:30—Presentation of Awards for National Crushed Stone Association Safety Contest—Scott Turner, Director, U. S. Bureau of Mines, Washington, D. C.
10:45—Remarks of Acceptance.
11:00—Business Meeting.
a. Report of the Auditing Committee.
11:05 b. Report of the Resolutions Committee.
11:20 c. Address by President A. L. Worthen.
11:40 d. Discussion.
12:10—Report of the Nominating Committee and Election of Officers.
12:30—Greeting of President-elect.
12:40—Announcements.
12:45—Adjournment.

JOINT EXPOSITION LUNCHEON

1:00—Everyone, including active members, as well as guests, is cordially invited to attend.

WEDNESDAY AFTERNOON

2:30—Inspection of the Joint Exposition. All of Wednesday afternoon has been expressly set aside for the purpose of giving all in attendance at the convention an opportunity to leisurely and studiously inspect the most comprehensive display of equipment, machinery and supplies used in the production, distribution and consumption of crushed stone, sand and gravel and ready-mixed concrete.

WEDNESDAY EVENING

9:00—Highway and Building Congress Ball—Statler Hotel.

THURSDAY, JANUARY 19

Highway Day—Highway and Building Congress.
(See page 10 for detailed program)

THURSDAY EVENING

7:00—Highway and Building Congress Banquet—Masonic Temple, Detroit.

FRIDAY, JANUARY 20

Construction Day—Highway and Building Congress

REMEMBER!

Extraordinary reductions in railroad fares have been authorized for the Highway and Building Congress, Detroit, Michigan, during the week of January 16, 1933.

Reduced fares will be in effect under the certificate plan, but contrary to the procedure of the past few years certificates will not be distributed from the headquarters office of the National Crushed Stone Association. On purchasing "going" ticket to Detroit, certificate *must be obtained from ticket agent.* This certificate must be validated in Detroit and when presented to ticket agent there permits the purchase of return ticket at reduced rate.

Highway and Building Congress

Program for Highway Day Thursday, January 19, 1933

MORNING SESSION

T. H. Cutler, President, American Road Builders' Association, Presiding

1. "Highway Program of the Nation—Its Present Status and the Outlook for the Future"—Willard T. Chevalier, Director, Civil Engineering Publications, McGraw-Hill Publishing Co., New York City.
2. "What Highways Mean in the Economic, Educational and Social Life of the United States"—Thomas H. MacDonald, Chief, U. S. Bureau of Public Roads, Washington, D. C.
3. "Cost to the American Public of Diversion of Gasoline Taxes and Motor Vehicle Fees from Their Lawful Purpose"—Ernest T. Smith, Executive Vice-President, American Automobile Association, and Vice-Chairman, National Highway Users Conference, Washington, D. C.

■

AFTERNOON SESSION

D. W. Merrell, Director, Department of Highways, State of Ohio, Presiding

4. "Importance of Highway Transportation to Economic Recovery"—Martin L. Pulcher, National Automobile Chamber of Commerce, Washington, D. C.
5. "Interest of the Farmer in Adequate Highways" Chester N. Gray, American Farm Bureau Federation, Washington, D. C.
6. "A Balanced Highway Program"—Grover C. Dillman, Commissioner, State Highway Department, Lansing, Michigan.

Freezing and Thawing Tests of Concrete Made With Stone-Sand Fine Aggregate

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THE May-June, 1932, issue of *The Crushed Stone Journal* contains an article entitled, "An Investigation of the Gradation of Stone-Sand for Concrete". Strength results are there recorded on concrete made with stone-sand as a fine aggregate graded in 17 different ways. The stone used for both fine and coarse aggregates was limestone having a percentage of wear of 3.3 and an apparent specific gravity of 2.77. The gradation of the coarse aggregate was as follows:

	Per cent
Total retained on 2 inch square opening	0
Total retained on 1½ inch square opening	27
Total retained on 1 inch square opening	55
Total retained on ½ inch square opening	83
Total retained on No. 4 square opening	100

The percentage of voids in this material was 44.7 by dry, loose volume and 39.3 by dry, rodded volume.

In Table I are given the characteristics of the fine aggregate.

Two different series of concretes were made, one designed to have a high modulus of rupture and the other a comparatively low modulus. The strength results obtained with the 17 different gradations of stone-sand are given in Tables II and III.

These tables are reproduced from the above mentioned article for the sake of completeness. After the beam specimens were broken, thus giving the strength results listed in the preceding tables, the remaining portions of the beams were used for the preparation of specimens for freezing and thawing tests. For this purpose one specimen, roughly cubical in shape, was made from each beam and the freezing tests were started when the specimens were 42 days old and after they had been cured 28 days in the moist room at 70° F., 7 days in air and 7 days immersed in water.

Apparatus Used in Freezing Tests

The apparatus for conducting the freezing tests has already been described. (See July, 1929, issue of *The Crushed Stone Journal*, page 19.) Briefly, however, it consists of a six-compartment ice-cream cabinet provided with electrical refrigeration. The specimens were completely immersed in water in 6½ in. by 6½ in. by 20 in. galvanized cans which in turn were immersed to not quite their full depth in alcohol contained in the compartments of the freezer. The alcohol merely

TABLE I
GRADATION AND OTHER CHARACTERISTICS
OF
STONE SAND USED IN TESTS

No.	Gradation of Stone Sand					Stone Sand Fineness Modulus	Percent Dust Passing #200	Unit Weight, lbs.		Per Cent Voids	
	Total per cent retained on							Loose	Rodded	Loose	Rodded
	8	16	30	50	100						
1	6	25	54	92	99	2.76	0.6	90.1	98.5	47.9	43.1
2	5	20	48	87	97	2.57	1.8	91.9	100.2	46.9	42.0
3	1	8	31	77	95	2.12	3.1	89.0	99.0	48.6	42.8
4	10	37	75	94	99	3.20	0.6	92.6	100.8	46.5	41.8
5	8	30	60	87	97	2.82	1.8	94.6	103.6	45.3	40.2
6	4	20	42	78	95	2.39	3.1	92.2	102.7	46.7	40.7
7	1	10	28	67	94	2.00	3.7	90.0	102.0	48.0	41.1
8	13	47	74	94	99	3.27	0.6	95.0	102.9	45.2	40.6
9	11	41	66	88	97	3.03	1.8	97.0	105.3	44.0	39.1
10	7	29	54	79	95	2.64	3.1	97.4	106.6	43.8	38.4
11	4	16	40	67	93	2.20	4.3	96.0	104.7	44.6	39.5
12	19	55	73	89	97	3.33	1.8	99.7	108.8	42.4	37.1
13	13	41	65	80	95	2.94	3.1	100.9	109.8	41.7	36.6
14	9	29	47	68	93	2.46	4.3	99.1	109.6	42.7	36.7
15	18	51	66	79	94	3.08	3.7	103.0	112.5	40.5	35.0
16	13	40	56	70	93	2.72	4.3	101.7	111.0	41.3	35.8
17	21	55	60	69	94	2.99	3.7	104.3	114.2	39.7	33.9

TABLE II
DATA ON CONCRETE
PAVEMENT MIXES HAVING APPROXIMATELY CONSTANT STRENGTH
MADE WITH 17 GRADATIONS OF STONE SAND

No.	Slump (ins.)	Flow	Workability	W/C	Bags cement per Cu. Yd.	Strength (14 days)		b/b$_o$	Proportions (Loose Volume)			Proportions (Rodded Volume)		
						Modulus Rupture lbs./sq. in.	Compression lbs./sq. in.		Cement	F. A.	C. A.	Cement	F. A.	C. A.
1	1-¼	160	2	.81	6.06	776	3940	.74	1	2.5	3.6	1	2.3	3.3
2	2-½	172	1	.74	6.97	882	4520	.76	1	2.0	3.3	1	1.8	3.0
3	2	159	1	.69	7.34	945	4580	.77	1	1.8	3.1	1	1.6	2.8
4	1-¾	159	2	.74	6.13	828	4470	.76	1	2.4	3.7	1	2.2	3.3
5	2	160	2	.72	6.37	958	4350	.76	1	2.3	3.6	1	2.1	3.2
6	2	174	1	.71	6.92	975	4760	.76	1	2.0	3.3	1	1.8	3.0
7	3-½	181	1	.73	7.18	772	4660	.76	1	1.9	3.2	1	1.7	2.9
8	1-¼	159	4	.76	6.00	913	4280	.76	1	2.6	3.8	1	2.4	3.4
9	1-¾	172	3	.72	6.37	864	4380	.77	1	2.3	3.6	1	2.1	3.3
10	1-¾	150	3	.76	6.16	784	4070	.76	1	3.4	3.6	1	2.2	3.3
11	2-½	162	1	.72	6.91	842	4580	.77	1	2.0	3.3	1	1.8	3.0
12	½	144	5	.77	5.66	893	3890	.76	1	2.0	4.0	1	1.7	3.6
13	2	150	3	.77	5.95	894	4150	.76	1	2.5	3.8	1	2.3	3.4
14	1-½	145	2	.75	6.38	884	4300	.76	1	2.2	3.6	1	2.0	3.2
15	1-½	158	2	.76	5.87	888	4360	.76	1	2.5	3.8	1	2.3	3.5
16	2-¼	158	1	.76	6.21	889	4650	.76	1	2.3	3.7	1	2.1	3.3
17	2-¼	162	2	.78	5.93	869	4720	.76	1	2.4	3.8	1	2.2	3.5

Notes: Workability numbers indicate: 1—Excellent; 2—Very Good; 3—Good; 4—Fair; 5—Poor.
W/C—Water cement ratio, *i.e.* ratio of volume of water to volume of cement used in the mixture.
b is the solid volume of coarse aggregate per unit volume of concrete.
b$_o$ is the solid volume of coarse aggregate per unit volume of coarse aggregate measured dry and loose.
F. A. means "fine aggregate."
C. A. means "coarse aggregate."

TABLE III
DATA ON CONCRETE
PAVEMENT BASE MIXES HAVING APPROXIMATELY CONSTANT STRENGTH
MADE WITH 17 GRADATIONS OF STONE SAND

No.	Slump (ins.)	Flow	Workability	W/C	Bags cement per Cu. Yd.	Strength (14 days)		b/b$_o$	Proportions (Loose Volume)			Proportions (Rodded Volume)		
						Modulus Rupture lbs./sq. in.	Compression lbs./sq. in.		Cement	F. A.	C. A.	Cement	F. A.	C. A.
1	1-½	178	4-5	1.18	4.23	536	1840	.75	1	3.6	4.8	1	3.3	4.3
2	1	176	3	1.10	4.45	544	2130	.76	1	3.2	4.6	1	3.0	4.2
3	1-½	179	2-3	1.03	4.76	616	2480	.77	1	3.0	4.4	1	2.7	4.0
4	½	179	5	1.21	3.98	492	1450	.74	1	3.8	5.0	1	3.5	4.5
5	½	184	4-5	1.06	4.23	550	2240	.76	1	3.5	4.9	1	3.2	4.4
6	2	200	1-2	1.12	4.47	496	2100	.76	1	3.2	4.6	1	2.9	4.2
7	1-½	190	1	1.10	4.72	545	2150	.77	1	3.0	4.4	1	2.7	4.0
9	¾	183	5	1.09	4.26	511	1960	.76	1	3.4	4.8	1	3.2	4.4
10	1-¼	168	3-4	1.15	4.10	496	1870	.75	1	3.6	4.9	1	3.2	4.5
11	1-¾	191	1-2	1.06	4.50	548	2320	.77	1	3.1	4.6	1	2.9	4.2
14	1	165	2-3	1.12	4.17	484	2110	.77	1	3.5	5.0	1	3.1	4.5
16	1-¼	169	4-5	1.13	3.99	518	2350	.77	1	3.7	5.2	1	3.4	4.7
17	1-½	170	3-4	1.13	3.81	562	2140	.76	1	3.9	5.4	1	3.5	4.9

Notes: Workability numbers indicate: 1—Excellent; 2—Very Good; 3—Good; 4—Fair; 5—Poor.
W/C—Water cement ratio, *i.e.* ratio of volume of water to volume of cement used in the mixture.
b is the solid volume of coarse aggregate per unit volume of concrete.
b$_o$ is the solid volume of coarse aggregate per unit volume of coarse aggregate measured dry and loose.
F. A. means "fine aggregate."
C. A. means "coarse aggregate."

serves to conduct the heat away rapidly from the specimens thus hastening the freezing action.

In general, the temperature of the brine in the freezing cabinet ranged from —10° to +8° F. when the specimens were immersed but due to the heat of the specimens this temperature usually rose 20 to 25° F. in from 3 to 4 hours and then gradually subsided during the freezing period, practically back to the initial temperature.

Twelve hours freezing in the cabinet and 8 hours thawing in the air of the laboratory constituted a freezing cycle. At the end of a scheduled number of cycles, all of the concrete specimens were weighed in their wet condition after removing the loose, disinte-

grated concrete by washing. In the following table No. IV are shown the average losses in weight of the concrete after 10, 20, 40, 60, 80 and 100 cycles respectively. The first portion of the table applies to the high strength concrete (Series I) and the second portion to the concrete of low strength. (Series II)

Analysis of Test Data

In an attempt to analyze the test data, the percentages of loss in weight were plotted against the fineness moduli in one case and against cement content in another, for each of the two series of tests. The results are shown in Figs. 1, 2, 3 and 4. Figs. 1 and 2 apply to the first series and Figs. 3 and 4 to the second series of tests. It will be recalled that the first series was designed to produce constant high strength and the second series constant low strength concrete.

Referring to Fig. 1, it will be noted that there seems to be a trend toward a greater loss in weight with increasing fineness modulus of the fine aggregate. In general, the higher the fineness modulus, the less is the amount of cement used in the mixture and in Fig. 2 it will be noted that after freezing there is a general trend toward a greater loss in strength with a decreasing cement factor. In the low strength concrete, (Figs. 3 and 4) where the cement factors were all below 4.8 bags per cu. yd., it cannot be said that there is any trend. It is almost impossible to draw any definite conclusions from these curves because the water-cement ratio varies in the different mixes and it has been shown in freezing tests by other investigators that the water-cement ratio has a lot to do with the durability of concrete which is subjected to freezing conditions.

In Fig. 5 are plotted the results obtained between percentage of loss of weight at the end of 100 cycles and the water-cement ratios of the respective mixes. The test results are all included within the band shown in this figure. These data would have been

TABLE IV

FREEZING AND THAWING TEST OF STONE SAND CONCRETE

(Test started when Specimens were 42 Days old. Cured: 28 days in moist room, 7 days in air, and 7 days in water.)

Series I—Average Modulus of Rupture 875 lbs. per sq. in. W/C = 0.69 — 0.81

	Per Cent Loss in Weight					
	No. of Cycles					
Specimen No.	10	20	40	60	80	100
1	0	0	1.1	2.2	2.7	4.9
2	0	0	1.1	2.3	3.4	4.0
3	0	0	0.5	0.5	2.2	3.3
4	0	0	1.1	2.2	3.3	5.6
5	0	0	0.5	1.6	1.6	3.2
6	0	0	0.6	1.1	2.3	4.0
7	0	0	1.1	1.6	2.7	3.8
8	0.6	0.6	1.1	3.9	4.4	6.7
9	0	0	1.6	2.2	3.8	6.0
10	0	0	1.7	2.5	3.3	4.4
11	0	0	1.1	2.0	2.2	3.4
12	0	0	1.6	2.2	4.4	6.6
13	0	0	1.4	2.3	3.5	4.6
14	0	0.3	1.1	2.7	3.3	4.9
15	0.3	0.3	1.6	2.5	4.4	7.1
16	0.6	0.6	1.6	2.2	3.8	4.4
17	0	0.6	1.4	4.0	4.5	6.3

Series II—Average Modulus of Rupture 560 lbs. per sq. in. W/C = 1.03 — 1.21

	Per Cent Loss in Weight					
	No. of Cycles					
Specimen No.	10	20	40	60	80	100
1	0	0.8	3.0	8.6	9.4	31.0
2	0	1.1	2.2	3.0	11.5	15.9
3	0	0.9	3.3	6.3	9.9	11.6
4	0	0.5	4.3	13.0	18.9	89.4
5	0	0.5	2.0	6.6	14.8	35.7
6	0	0.5	2.8	8.0	16.8	50.4
7	0	0.5	3.2	4.3	8.6	14.4
9	0	1.1	2.2	5.9	11.8	18.8
10	0.3	0.8	4.0	7.7	14.7	20.5
11	0	0.5	2.5	5.0	7.6	13.6
14	0	0	1.5	4.1	12.8	20.9
16	0	0.5	4.1	8.7	19.0	35.0
17	0.3	0.8	4.1	5.1	7.1	15.2

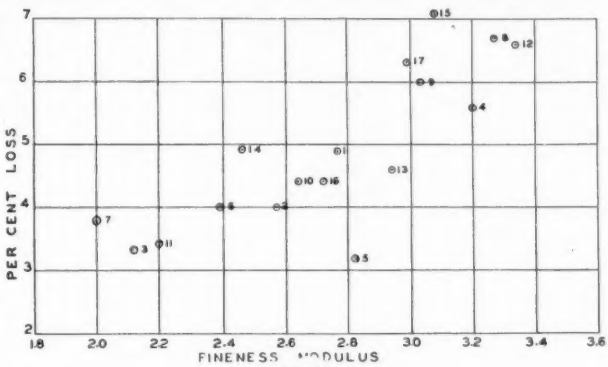


FIGURE 1

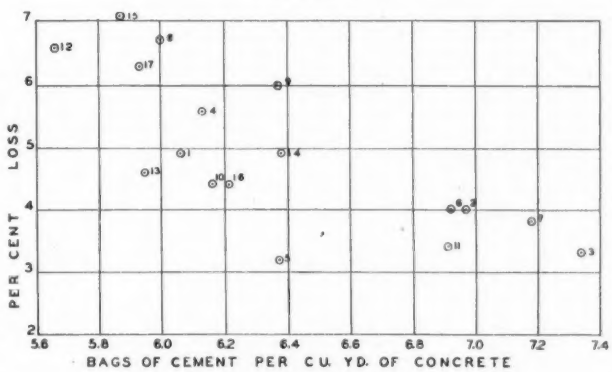


FIGURE 2

Low Water-Cement Ratio Concrete (0.69-0.81) Relation Between Percentage of Disintegration, Fineness Modulus of Fine Aggregate and Cement Factor.

more complete had additional tests been made on concrete having water-ratios between 0.8 and 1.0. However, this figure is very interesting for it very strongly

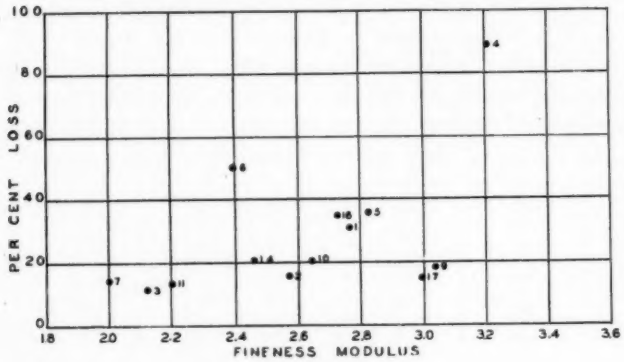


FIGURE 3

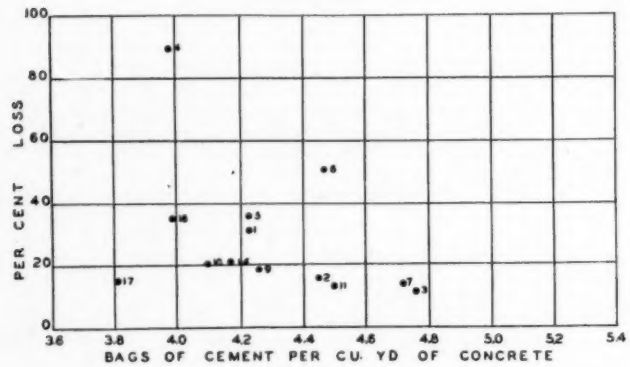


FIGURE 4

High Water-Cement Ratio Concrete (1.03-1.21) Relation Between Percentage of Disintegration, Fineness Modulus of Fine Aggregate and Cement Factor.

indicates that when this concrete has a water-cement ratio of above 1.0 it would not be safe for exposure to severe freezing conditions. This might be taken as somewhere near the critical water-ratio for durable concrete composed of materials of the kind used in these tests.

In Figs. 6 and 7 is shown the appearance of the two series of test specimens after 100 cycles of freezing and thawing. It is interesting to note that the disintegration was due entirely to the failure of the mortar as evidenced by the fact that the coarse aggregate remained intact and projected out beyond the face of the mortar after the completion of 100 cycles. Thus again is illustrated the oft-proved fact, that the most vulnerable portion of concrete when exposed to the weather is the mortar and the amount of mixing water employed in relation to the cement content seems to be the main factor in determining the resistance of concrete to the weather.

It is very strongly indicated by the present tests that the critical water-ratio lies in the vicinity of 1.0 and possibly for severe conditions it should be even lower than this value.

The present series of tests is of special interest in view of the fact that prepared limestone sand was used as the fine aggregate. One of the specimens marked "Potomac River" was made with Potomac River sand such as used in the city of Washington for concrete making. The water-ratios of this mixture were 0.75 in Series I and 0.96 in Series II and it will be noted from the photographs that at the end of 100 cycles these specimens present an appearance which indicates no greater resistance to freezing and thawing than in concrete made with stone sand.

All of the stone-sand concretes in Series II (see Figs. 2 and 4) had a higher water ratio than the Potomac River sand concrete, yet many of them show no more disintegration than the concrete made with the natural sand.

It should be noted that both sands may be regarded as sound and the disintegration which has taken place is not due to the aggregates. There is no indication

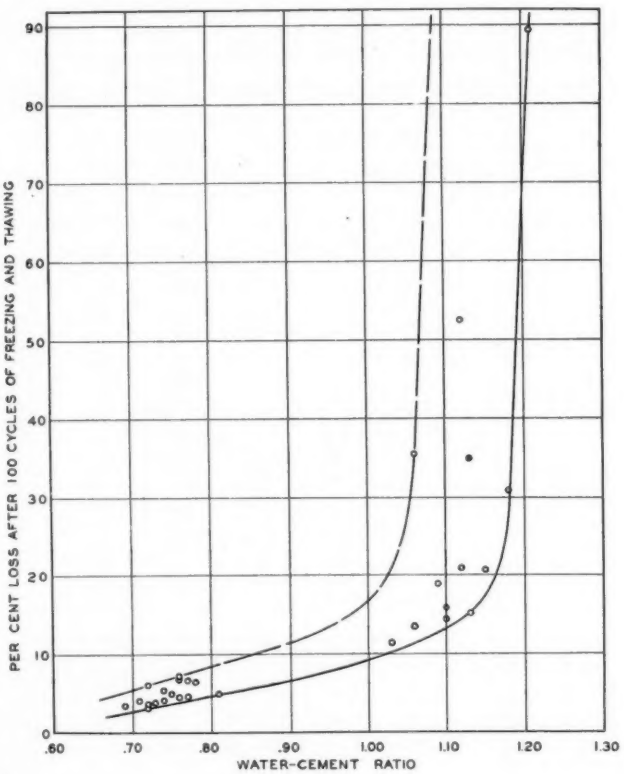


FIGURE 5

Curve Showing Effect of Water-Cement Ratio on the Resistance of Stone-Sand Concrete to Freezing and Thawing.

from these tests that concrete made with sound stone sand is any less resistant than concrete made with sound natural sand.

Auxiliary Accelerated Soundness Tests

Soundness tests were made on both the fine and coarse aggregates used in the preceding investigations

and the results are given in the following Table No. V. In Table V (a) are shown the percentages of loss of the coarse aggregate after the designated number of

FIGURE 6

Stone-Sand Concrete After 100 Cycles of Freezing and Thawing. These specimens Have Low Water Ratios and Show High Resistance.

cycles of freezing and thawing and in Table V (b) are shown the results of the sodium sulphate soundness test for both five and ten cycles. This table is interesting to those concerned with standardization of the sodium sulfate soundness test.

The standard method of the American Society for Testing Materials calls for sieving the material through the minimum size screen used in preparing each fraction to determine the loss in the test. Thus, for illustration, to determine the loss of the 1½ to 2½ inch fraction, the material is sieved through the 1½ inch screen after five cycles of the sodium sulfate test. This gave a loss of 2.8 per cent. In the present series of tests this loss was also determined on screens having smaller openings than those called for in the tentative standard and it will be noted that invariably the percentage of loss is smaller when smaller size screens are used for the determination of loss.

It may well happen that in preparing the fractions of the different sizes according to the A. S. T. M. methods, a large percentage of any given fraction

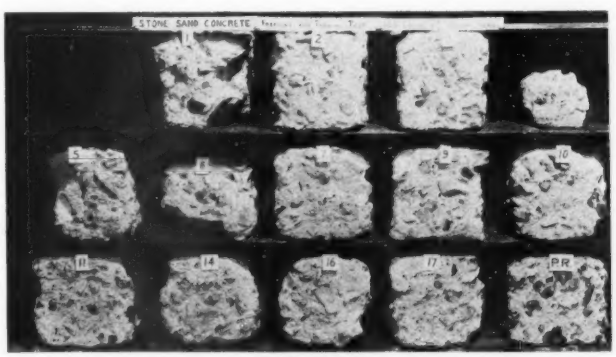


FIGURE 7

Stone-Sand Concrete After 100 Cycles of Freezing and Thawing. These Specimens Have High Water Ratios and Show Low Resistance to Freezing.

may have a size closely approximating the minimum size screen used in preparing the fraction. Consequently, when this material breaks down to some extent in the sodium sulfate test, a large percentage of this fraction may be considered as having disintegrated because it passes through the minimum size

TABLE V

Soundness Test by Freezing and Thawing, Sodium Sulfate and Magnesium Sulfate Tests on Fine and Coarse Aggregates—W. Va. Limestone No. 35.

V (a)

Coarse Aggregate

Freezing and Thawing—Per Cent Loss

Cycles	5	10	20	30	40	50	60	70	80	90	100
No. of Pieces	10	10	10	10	10	10	8	8	8	8	8
Per cent Loss	0.2	0.4	2.1	4.7	10.0	12.6	22.6	23.0	24.6	28.1	28.5

V (b)

Sodium Sulfate—Per Cent Loss

Size	2½ - 1½		1½ - ¾		¾ - ⅜		⅜ - No. 4		
Cycles	5	10	5	10	5	10	5	10	
	2.8	8.9							1½" Sieve on which
	1.4	3.4							1 material was
			0.6	9.1					¾ tested after spe-
			0.6	6.3					½ cified number of
			0.4	2.9	1.0	8.3			⅜ cycles
					0.3	3.0	6.	16	No. 4

V (c)

Magnesium Sulfate—Per Cent Loss

0.0						1½
0.0						1
		1.2				¾
		0.6				½
		0.3		0.3		⅜
				0.3	2.	No. 4

V (d)

Fine Aggregate

Freezing and Thawing—Per Cent Loss

Cycles		5	10	20	30	40	50	60	70	80	90	100
Size	¾- 4	1	4	8	14	16	19	23	25	29	32	35
	4- 8	--	--	2	3	4	4	4	5	8	10	11
	8- 16	1	2	2	2	2	2	2	2	2	2	3
	16- 30	2	2	3	3	4	5	5	6	6	6	6
	30- 50	2	2	2	2	3	3	3	4	4	5	5
	50-100	1	1	1	1	1	1	1	1	1	1	1

V (e)

Per Cent Loss

	Sodium Sulfate		Magnesium Sulfate
Cycles	5	10	5
Size ¾- 4	6	16	2
4- 8	3	5	2
8- 16	1	2	3
16- 30	3	5	8
30- 50	2	4	4
50-100	8	12	10

screen. On the other hand, suppose another sample of this material contains fragments, a large percentage of which do not lie close to the minimum size of opening and, consequently, although just as much of the material breaks off as in the preceding case, a

low percentage of loss is reported because these large size fragments are still too large to pass through the minimum size opening. This illustrates a fallacy in the proposed tentative A. S. T. M. method for determining the percentage of loss and it is suggested that the test procedure be altered to require the use of a screen having one-half or some other fraction of the opening of the minimum size screen used in the preparation of the test.

In Table V (c) are shown the results of the magnesium sulfate test made in the same manner as the sodium sulfate test. There seems to be no relation between these two tests and it is surprising to note that the magnesium sulfate results are lower than the sodium sulfate results. This is contrary to the usual relation of the results obtained with these two tests. Other investigators, however, have noted this reversal of relationship with other materials. The question naturally arises: If these two forms of tests give not only a lack of uniformity but actually a reversal in their related values, what interpretation can be placed on the test results in terms of actual service behavior? It yet remains to be shown which of the two tests is most indicative of service value, if indeed either test is truly indicative.

Table V (d) shows the results of freezing and thawing tests on the stone-sand fractions and Table V (e) shows the sodium sulfate and magnesium sulfate losses on the same sand fractions. Note the high losses in the sodium sulfate and magnesium sulfate tests on the No. 50 to No. 100 material. This material gave the lowest loss in the freezing test. The indications are that the sodium sulfate and magnesium sulfate tests may be unusually severe in their action on finely divided limestone sand while freezing tests do not show this same severity of action. *It is quite evident that the results of any accelerated soundness test at present must be interpreted with caution and this will continue to be so until accelerated tests are definitely tied in with service behavior.*

Emergency Highway Funds Total $91,000,000

ALLOTMENT of Federal emergency funds to definite highway construction projects provided for under the Emergency Relief and Construction Act of July 21, 1932, amounted to $91,042,932 on Nov. 30, according to the Bureau of Public Roads of the United States Department of Agriculture. Approximately $29,000,000 of the emergency funds remain available for new projects. Emergency funds are available for expenditure only during the present fiscal year which ends June 30, 1933.

The Act appropriated $120,000,000 to be advanced to the States for use in connection with regular Federal-aid funds on the Federal-aid system. The Federal Government is to be reimbursed by deductions from regular Federal-aid apportionments over a 10-year period beginning with 1938.

O. P. Chamberlain Victim of Automobile Accident

TO HIS many friends in the crushed stone industry and especially to those who had the privilege of knowing him intimately because of his active and loyal work in the affairs of the National Crushed Stone Association for many years past, the sudden death of Col.

O. P. Chamberlain

O. P. Chamberlain will be distressing news. At the time of this writing our information regarding his demise is meagre. On Saturday, December 10, 1932, he was apparently endeavoring to cross Michigan Avenue at Randolph Street in Chicago against the traffic light and was struck by a fast-moving vehicle, speeds up to forty-five and fifty miles an hour being customary on Michigan Avenue. Funeral services took place at the Episcopal Church, LaGrange, Illinois. The National Crushed Stone Association was represented through its Northern Regional Vice-President, W. R. Sanborn.

Col. Chamberlain has been numbered among the Association's loyal and enthusiastic supporters since its very organization and although recently resigned from its Board of Directors because of taking up new work in another field he will long be remembered for his staunch and generous support. To his family and business associates we extend our deep and profound sympathy.

Making Convention HISTORY!!!

THREE big conventions, held at the same time and in the same place, mark an epoch in trade gatherings of significance to all producers of crushed stone, sand and gravel, and ready mixed concrete. Concurrent conventions, but with independent sessions, will be held by the National Sand and Gravel Association, the National Ready Mixed Concrete Association and the National Crushed Stone Association, at the Book-Cadillac Hotel, Detroit, during the week of January 16th, 1933.

This unique arrangement offers unusual reasons for attendance by *everyone* whose business interests are connected with these industries, whether an Association member or not. "Everyone" includes superintendents and operating men as well as executives—the full personnel—because low railroad rates permit companies to send twice their usual number of convention representatives for practically the same cost as other years.

Round-trip fares to Detroit for the three conventions have been reduced to one and one-ninth the cost of one-way fares! This is making convention history in the matter of transportation expense. The three associations will participate in a joint Congress smoker, joint banquet, and will hold a Joint Exposition of machinery and equipment used in the production, distribution and consumption of products in these industries. This "pooling" arrangement secures lower rates for fees, rooms and meals than would be the case if each convention were held at a different time, in a different hotel, in a different city.

Thus is convention history being made in economy and convenience of arrangements,—for the main activities and sessions of all three conventions, the Joint Exposition, registration booths and headquarters are under the same roof.

The Joint Exposition assures producers that America's foremost manufacturers will be eager to exhibit their products to three such closely related industries at one time. Constant changes take place in the processes and products of these industries, and every producer will want to see the latest developments and improvements in equipment for increasing production efficiency and economy.

The same week, in Detroit, many related organizations and individuals in the construction industry will attend the Highway & Building Congress. A dramatic mobilization of all interests in the construction world will cooperate to educate the nation to the economic necessity of "carrying on" with a broad program of construction.

What a climax to this history-making event! *You* can't afford to have any man in your organization miss it. All will be more productive employees for having attended. But—it is imperative that you make up your list — N O W — and send in your firm's reservations—TODAY!

A 3-in-1 Exhibit

Held jointly with the Annual Conventions of National Sand and Gravel, National Ready Mixed Concrete, and National Crushed Stone Associations

Book-Cadillac Hotel
Detroit
Jan. 16-20, 1933

SIXTEENTH ANNUAL CONVENTION NATIONAL CRUSHED STONE ASSN.

DETROIT, MICHIGAN
JANUARY 16-18, 1933

GREETINGS TO THE MEMBERS OF

The National Crushed Stone Association

IN CONVENTION JANUARY 16, 17 AND 18

AT THE

Book--Cadillac Hotel

DETROIT, MICH.

v
v
v

Please be sure and send in your reservations in time

ROOM RATES

SINGLE ROOM AND BATH, $3 up
DOUBLE ROOM AND BATH, $5 up

◆

Three splendid restaurants—economy prices

THE CAFETERIA — THE BOULEVARD
THE NEW MAYFAIR ROOM

The Book-Cadillac, where meeting and exhibits will be held

Book-Cadillac Hotel

WASHINGTON BOULEVARD AT MICHIGAN AVE. · DETROIT

Under Ralph Hitz direction · E. T. Lawless, Manager

HOTEL NEW YORKER, NEW YORK **VAN CLEVE, DAYTON**

also under Ralph Hitz direction

FOODSY-WOODSIES

I stopped at the grocery counter and took out the list my wife had given me. "I want," I said to the clerk, "a loaf of Mumsie's Bread, a package of Krunchies, some Goody Sanny Spread, Ole Mammy's 'Lasses, Orange Puddy, Bransie Buns, and a pound of Aunty Annie's Sugar Can'y, Bitsey-bite size."

"Sorry, no Krunchies. How about Krinkly Krisps, Oatsies, Maltsey Wheats, Ricelets, Cornsie Ponesies, or Wheetums?"

"Wheetums, then."

"Anything else? Tootsies, Tatery Chips, Cheesie Weesies, Gingie Bits, Itsey Cakes, Sweetsie Toofums, or Dramma's Doughnies?"

"Tan't det anysin' else," I said, toddling toward the meat department to look for teensy weenies and a leg of lambikins.

—*Judge.*

Simplicity
TRADE REGISTERED MARK
Gyrating Screens
Actual Performance on the Job Proves Simplicity Screening Superiority. Comparisons Invited.
There is a Reason—Ask the Operator or
Simplicity Engineering Co.
Durand, Michigan
See our exhibit—Booths 59 and 60
Joint Exposition—Detroit, Michigan, January 16, 17, 18 and 19, 1933

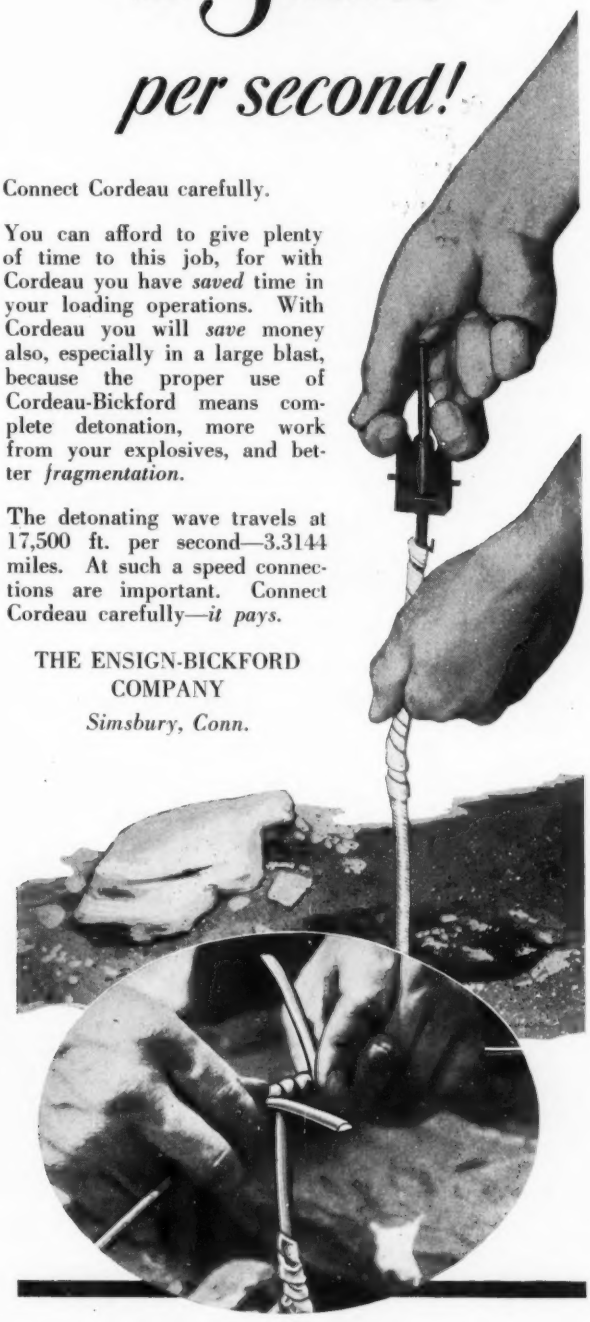
Taking the switch
at 3 miles
per second!

Connect Cordeau carefully.

You can afford to give plenty of time to this job, for with Cordeau you have *saved* time in your loading operations. With Cordeau you will *save* money also, especially in a large blast, because the proper use of Cordeau-Bickford means complete detonation, more work from your explosives, and better *fragmentation.*

The detonating wave travels at 17,500 ft. per second—3.3144 miles. At such a speed connections are important. Connect Cordeau carefully—*it pays.*

THE ENSIGN-BICKFORD COMPANY
Simsbury, Conn.



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DETONATING FUSE
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Clean-Cut Screening

The very fact that Hendrick Double-Corrugated Plate has no smooth surfaces in any direction implies constant stirring up of the load. This means clean screening.

And the fact that Hendrick Double-Corrugated Plate is heat-treated implies a metal free from strain. This means long life for the screening medium.

Try it out and see for yourself.

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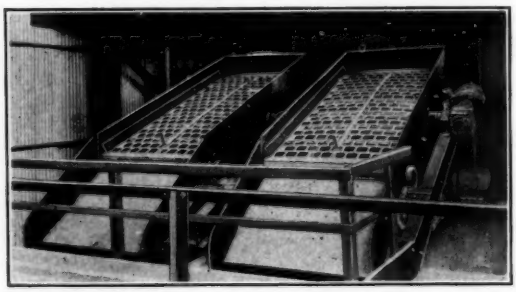
The quality of CROSS Screens gives longer service, increased production and lower cost.

CATALOG ON REQUEST.

BUCKETS, TROUGH, FLIGHTS, CHUTES, ETC.



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CROSS PERFORATED PLATES ON TYPICAL VIBRATING SCREEN INSTALLATION.

Write for details of advantages and cost.

CROSS ENGINEERING CO.

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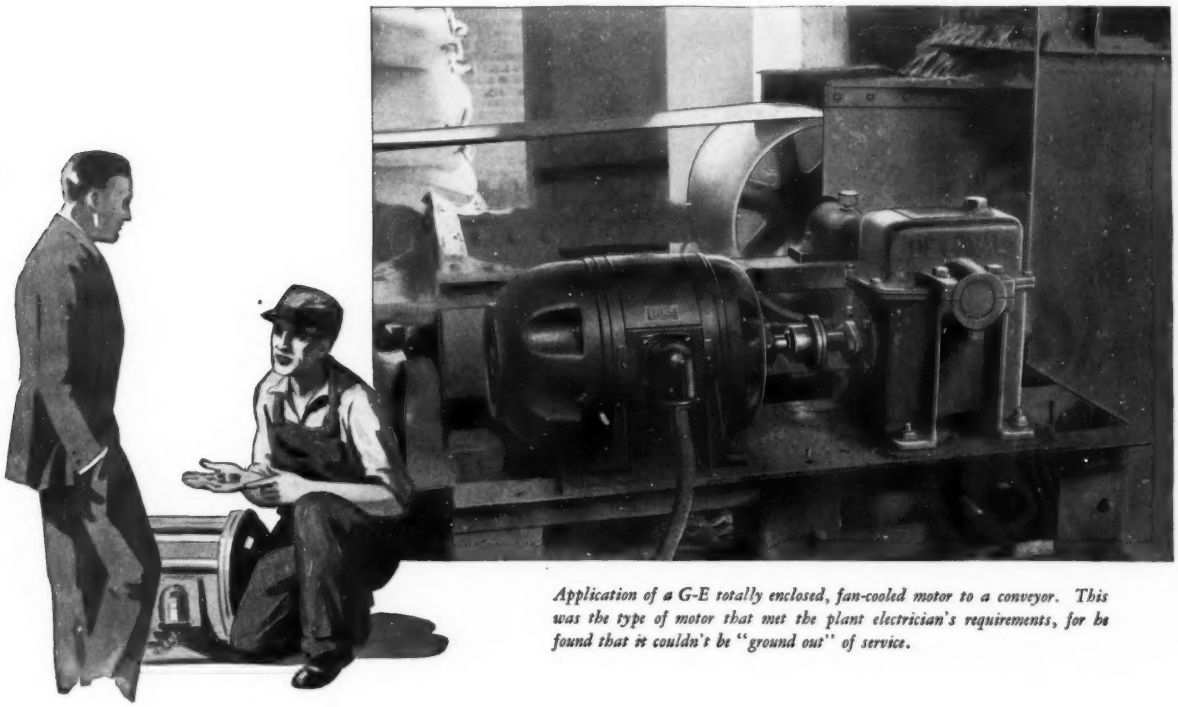
"It makes a swell grinding compound BUT--what it does to motors is nobody's business!"



Application of a G-E totally enclosed, fan-cooled motor to a conveyor. This was the type of motor that met the plant electrician's requirements, for he found that it couldn't be "ground out" of service.

THAT'S how one plant electrician expressed himself—the "it" in question is that potent mixture which occurs when cement or rock dust get together with oil. But it is somebody's business—everybody's business, to be exact—when motors fail because destructive substances get in.

General Electric totally enclosed, fan-cooled induction motors are designed and built to minimize maintenance difficulties and expenses usually experienced in operating motors under unfavorable conditions. They are well suited for such trying service as out-of-door operation at all times of the year; driving conveyors in cement plants where cement or rock dust is always present; operation in the presence of moisture; and in many other adverse locations.

Your operating department should have complete information about these motors. The nearest G-E office will be glad to send you a copy of publication GEA-1326A, and to answer any further questions.

Consider G-E totally enclosed, fan-cooled motors and General Electric's nine other modernization tools in your 1932 modernization program. You'll find every one of them a profitable investment.

MODERNIZATION REDUCES COSTS — INCREASES PROFIT

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GENERAL ELECTRIC

GOING....GOING....
GOING FAST!!

Choice Booth Locations at
JOINT EXPOSITION

MANUFACTURERS' DIVISIONS OF
NATIONAL CRUSHED STONE ASSOCIATION
NATIONAL READY MIXED CONCRETE ASSN.
NATIONAL SAND & GRAVEL ASSOCIATION

"THE Early Bird Catches the Worm" . . . "First Come, First Served" . . . two old, sage maxims, but they express vividly the value of reserving exhibit space in the Joint Exposition without another day's delay.

There are so many attractive features in this novel idea of merging three major markets into one—affording machinery and equipment manufacturers greater convenience and economy in exhibiting their products to the sand and gravel, crushed stone, and ready-mixed concrete industries—that it is no wonder exhibitors have shown an immediate response to the call for reservations.

The National Crushed Stone Association, the National Ready Mixed Concrete Association, and the National Sand & Gravel Association, holding their annual conventions and Joint Exposition at the Book-Cadillac Hotel, Detroit, the week of January 16 to 20, 1933—in conjunction with the Highway & Building Congress—offer you an unparalleled concentration of actual and potential users of your products.

Real economy in exhibiting costs is effected. Railroad fares lower than ever granted before (round-trip tickets at one and one-ninth the regular one-way fare); and a three-in-one exposition, in one hotel, one city, one week—mean considerable reduction in expenses for traveling, hotel rooms and meals, and the time that your sales representatives must devote to your exhibit.

The economy and novelty of this Joint Exposition are creating a stimulating response from manufacturers. The old law of supply and demand must be reckoned with—better act now—*telephone or wire your application* today.

Book-Cadillac Hotel
Detroit, Mich.
JANUARY 16-19, 1933

16th Annual Convention of National Crushed Stone Association; 3rd Annual Convention of National Ready Mixed Concrete Association; 17th Annual Convention of National Sand and Gravel Association; held concurrently and with Joint Exposition.

JOINT EXPOSITION COMMITTEE

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